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ORIGINAL ARTICLE

Somatic Health and Psychosocial Background Among Finnish Adolescents with Gender Dysphoria Seeking Hormonal Interventions

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Abstract

Purpose: Although the number of young adults suffering from gender dysphoria (GD) is increasing, reports focusing on their somatic health remain scarce. We studied the somatic health, pubertal development, psychosocial background, and interest regarding gender-affirming surgical treatment of Finnish adolescents seeking gender-affirming hormonal treatment (GAHT).

Methods: In this retrospective register study at an adolescent gynecology clinic in Helsinki University Hospital, Finland we included 124 adolescents diagnosed with GD and referred to GAHT between January 1, 2011 and December 31, 2018. This cohort covered two thirds of all Finnish adolescents referred to GAHT during the follow-up. Data on the general adolescent population were obtained from the Finnish School Health Promotion (SHP) study of year 2017.

Results: Most adolescents were assigned female at birth. Sex ratio increased from 1.2 in 2012 to 5.2 in 2017. One-third of the patients were overweight or obese (body mass index [BMI] > 25 kg/m^2). Other somatic comorbidities were rare. Interest toward reconstructive genital surgery was more common among male-to-female than female-to-male patients (80% vs. 22%, respectively, $p < 0.001$). Depression (29%) and anxiety (19%) were common psychiatric comorbidities. Parental divorce rate (57%) was higher than in the general adolescent population in Finland (23%, $p < 0.001$).

Conclusion: Finnish adolescents diagnosed with GD-seeking GAHT have good somatic health, but a higher proportion of overweight, depression, and anxiety than the general adolescent population. Prospective follow-up of this cohort will provide an opportunity to evaluate the somatic and psychosocial outcomes and quality of life during GAHT.

Keywords: adolescents; gender-affirming hormonal treatment; gender dysphoria; gender identity; transgender gynecology

Introduction

Gender dysphoria (GD) is defined as "the distress and unease experienced if gender identity and designated gender are not completely congruent."[1] Puberty plays a significant role in the onset of GD in adolescence.[2] In two thirds of the cases, GD in adolescence first appears during or after endogenic puberty, defined as late-onset GD.[3] Many children express gender dysphoric behavior, but these symptoms usually desist during their development.[4] Only a minority ($\sim$15%) of these children continue to have symptoms of GD during and after puberty, defined as early-onset GD.[2] Untreated GD is associated with an increased risk for depression, anxiety, and eating disorders,[1,5] and it also has a significant negative impact on quality of life.[6] Adolescents suffering from GD are known to be at an elevated risk for bullying, self-destructive behavior or suicide, and sexual abuse.[7,8]

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Suppression of puberty with gonadotropin-releasing hormone (GnRH) analogs and gender-affirming hormonal treatment (GAHT) have become available for minors in many countries within the past decade. According to internationally accepted guidelines, GnRH analog treatment should be available for eligible minors with a diagnosis for GD, adequate social support, and a puberty stage of at least Tanner G2/M2 or greater.[1,9,10] Further, GAHT may be started at the age of 16 years if eligibility and readiness criteria are fulfilled.[9] In addition, many transgender (TG) adolescents later seek gender-affirming surgery, which may include chest masculinization, gonadectomy, hysterectomy, and reconstructive genital surgery (i.e., phalloplasty or metoidioplasty or vaginoplasty).

During the past 10 years, the number of adolescents referred to specialized gender identity services has been growing exponentially for unknown reasons in Europe and North America.[11–13] The ratio between adolescents assigned female at birth (female-to-male transgender, FtM) and adolescents assigned male at birth (male-to-female transgender, MtF) seeking treatment varies remarkably across different countries.[13] Although the number of adolescent FtM patients typically exceeds the number of MtF patients, the opposite is typically seen in adults.[14] Knowledge regarding people who first show signs of GD in adolescence is scarce, as research regarding the clinical treatment of adolescent GD has primarily focused on early-onset GD intensifying in puberty.[15] Moreover, little is known about the somatic health and family background of adolescents seeking GAHT.

In this retrospective register study, our aim is (1) to describe the somatic and psychiatric health, demographics, and family background of Finnish adolescents diagnosed with GD-seeking GAHT; (2) to assess interests and attitudes regarding future gender-affirming surgery among the study population; and finally (3) to assess whether the somatic health and psychosocial background of the study population differs from the general adolescent population in Finland.

Materials and Methods

In Finland, GD diagnostics and GAHT have been available for minors aged 13 to 17 years since 2011. The diagnostics of GD on adolescents is conducted by gender identity services at the departments of adolescent psychiatry at Helsinki and Tampere University Hospitals. Both clinics operate nationwide. The gender identity service unit at Helsinki University Hospital covers about two thirds of all adolescents with GD in Finland.[16]

The diagnostic process for GD in adolescence in Finland is designed (1) to assess the incongruence between the adolescent's experienced or expressed gender and assigned gender, using criteria set by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition,[17] (2) to rule out other severe psychopathology (such as neuropsychiatric disorders or psychosis) responsible for the experience of gender incongruence and/or preventing the diagnostic process, and (3) to assure eligibility and readiness. The multidisciplinary diagnostic process may lead to a diagnosis of GD (formerly Transsexualism, F64.0 in ICD-10 classification). The age limit of 16 years is generally applied for starting GAHT. Although chest masculinization has no legal age restriction, genital surgery is possible only for patients of at least 18 years of age. The same age limit applies for juridical gender recognition. For further information about the diagnostics process in Finland, see Kaltiala et al.[16]

The gender identity services closely cooperate with adolescent gynecology clinics at the two University Hospitals. The adolescent gynecology clinics are responsible for assessing the state of puberty and somatic health and ruling out somatic contraindications before hormonal interventions, including GnRH analog treatment and GAHT, and administration and somatic follow-up of hormonal interventions for both FtM and MtF transgender adolescents. In both cases, patients are referred to the adolescent gynecology clinics by the gender identity services.

In this study, we included 124 consecutive adolescents (104 FtM [83.9%] and 20 MtF [16.1%]) who: (1) had been referred to gender identity services at Helsinki University Hospital due to symptoms of GD before the age of 18 years, (2) were diagnosed with GD (F64.0 in ICD-10), and (3) were further referred to the adolescent gynecology clinic at Helsinki University Hospital between January 1, 2011 and December 31, 2018 for assessment of biological puberty stage, somatic health, and potential contraindications for hormonal interventions (Fig. 1).

Data on the demographics, family background, and psychiatric comorbidities were obtained from medical records at the first appointment with gender identity services. Data on the history of biological pubertal development, somatic health background, laboratory results, body mass index (BMI), blood pressure (BP),

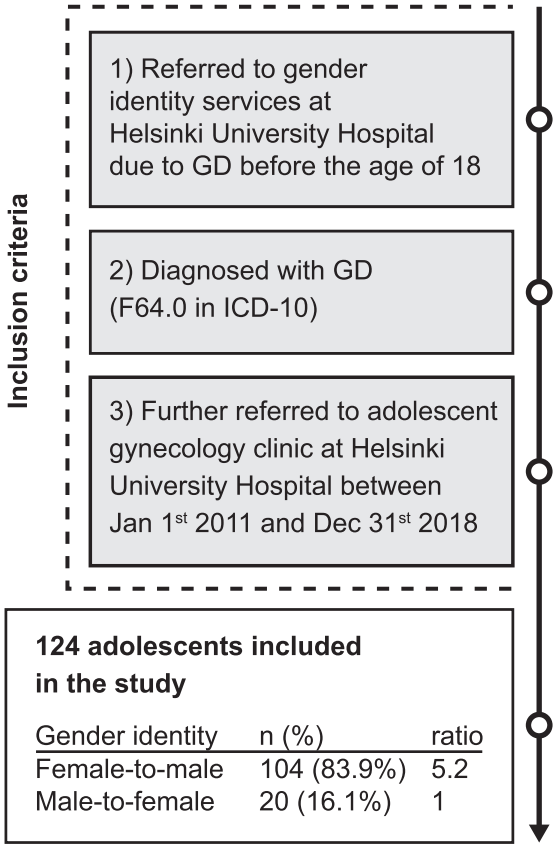
Inclusion criteria
1) Referred to gender identity services at Helsinki University Hospital due to GD before the age of 18
2) Diagnosed with GD (F64.0 in ICD-10)
3) Further referred to adolescent gynecology clinic at Helsinki University Hospital between Jan 1st 2011 and Dec 31st 2018
124 adolescents included in the study
Gender identity n (%) ratio
Female-to-male 104 (83.9%) 5.2
Male-to-female 20 (16.1%) 1

FIG. 1. Study population. GD, gender dysphoria; GAHT, gender-affirming hormonal treatment.

interest regarding gender-affirming surgery and fertility preservation, and self-reported sexual orientation were obtained at the time of first visit to the adolescent gynecology clinic. Overweight was defined as BMI between 25 and 30 kg/m^2, and obesity was defined as BMI more than 30 kg/m^2.

Where applicable, subjects were divided into groups based on their gender identity (FtM and MtF adolescents) for comparison. When comparing the results with the general adolescent population in Finland, data from the Finnish School Health Promotion (SHP) study of 2017 were utilized.[18] The study included 67,864 adolescents aged 17–18 years.

Statistical analyses

All statistical analyses were conducted by using IBM SPSS 25 software. Data are expressed as median (range) for nonparametric or mean ± standard deviation (SD) for parametric distributions, when not otherwise stated. Differences between FtM and MtF adolescents and the general adolescent population were analyzed by using two-sample *t*-test or one-way analysis of variance (ANOVA) for parametric, Kruskal–Wallis test for nonparametric, and Pearson chi-square test for categorical variables. A p-value of < 0.05 was considered significant.

Ethical approval

The study plan was approved by the Research Committee of the Helsinki University Hospital. Approval from the Ethics Committee was not needed in our register-based study, because none of the subjects or their caregivers were contacted. All data were pseudonymized before entering into the study database.

Results

Study population

The majority ($n = 104$, 83.9%) of the 124 adolescents seeking GAHT were assigned female at birth. Between 2011 and 2017, the cumulative ratio between FtM and MtF adolescents referred to the adolescent gynecologic clinic increased from 1.2 to 5.2 (Fig. 2). At the time of the first contact with the gender identity services, the median age of the patients was 16.7 years (range 12.1–18.0). The median age at diagnosis of GD was 18.1 (14.8–20.1) years, and the median duration of the diagnostic process was 17.3 (7.2–32.2) months. The median age at the time of assessment of puberty status and somatic health at the adolescent gynecology clinic was 17.7 (14.6–19.8) years. All patients initiated GAHT later. The age at the onset of symptoms of GD was not clearly reported in the patient charts. The median ages at the first contact with the gender identity team, with the adolescent gynecologic clinic, or at diagnosis did not differ between FtM and MtF groups and did not change significantly by time during the study period.

Somatic health and medication

The most common somatic comorbidities were overweight (23.6%), obesity (9.4%), and asthma (8.1%) (Table 1). Median BMI was higher among FtM adolescents than MtF adolescents (23.1 vs. 19.5, $p < 0.001$, Kruskal–Wallis test). Further, the proportions of overweight (25.3%) and obesity (11.5%) in FtM adolescents were higher than in the general female adolescent population (15.3% with a BMI more than 25 kg/m^2, $p < 0.001$, Pearson chi-square test).

Among the study cohort, no absolute somatic contraindications for GAHT were reported. The MtF adolescents had a higher mean systolic BP than FtM

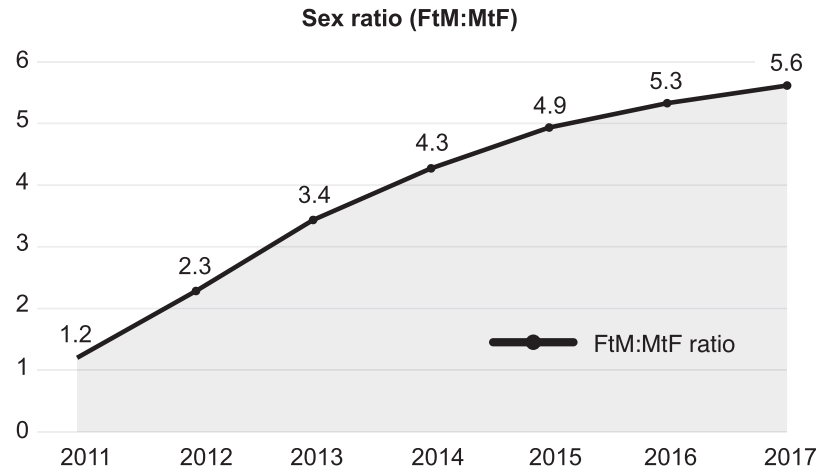

FIG. 2. Changes in cumulative ratio between FtM and MtF transgender adolescents referred to GAHT. FtM, female-to-male; MtF, male-to-female.

adolescents ($p = 0.003$, two-sample t-test), but the mean diastolic BPs did not differ (Table 1). There were no statistically significant associations between obesity and baseline BP levels. Eighteen (14.5%) adolescents smoked regularly. No extensive alcohol or narcotics use was reported.

All adolescents had completed their biological pubertal development. One case of congenital adrenal gland hyperplasia and one case of precocious puberty were reported among FtM adolescents. No delayed puberty was reported. The gynecological parameters are described in Table 2. Clinical hyperandrogenism in the form of acne, hirsutism, polycystic ovary syndrome, or clitoral hypertrophy was reported in 26.9% of the FtM adolescents. To suppress or prevent menstruation, two adolescents had used a continuous oral contraceptive, five a continuous progestin regimen, and five a cyclical oral contraceptive. At the adolescent gynecology clinic, to suppress menstruation, 44 (42.3%) FtM patients were prescribed 5–10 mg of lynestrenol (a progestin regimen) for daily use.

Three (15.0%) MtF adolescents reported the use of under-the-counter hormonal treatment. These included estradiol hemihydrate, estradiol valerate, cyproterone acetate, and spironolactone on adequate dosages. No nonprescribed hormone use was reported among FtM adolescents.

For FtM adolescents, a total of 89.6% of all baseline laboratory results were within reference range (Table 3). Parameters with the greatest aberrations

Table 1. Somatic Comorbidities of 124 Adolescents at the Beginning of the Gender Identity Diagnostics Process

Somatic parameters	Total ($n = 124$)	FtM ($n = 104$)	MtF ($n = 20$)	p
BMI (kg/m^2) at baseline[a]				
n (%)	106 (85.5)	87 (83.7)	19 (95.0)	
Median (range)	22.1 (16.4–39.0)	23.1 (17.2–39.0)	19.5 (16.4–29.9)	**<0.001**
Overweight (25 kg/m^2 ≤ BMI ≤30 kg/m^2), n (%)	25 (23.6)	22 (25.3)	3 (15.8)	0.38
Obesity (BMI >30 kg/m^2), n (%)	10 (9.4)	10 (11.5)	0 (0)	0.12
Blood pressure[a]				
n (%)	86 (69.4)	69 (66.3)	17 (85.0)	
Systolic (mmHg)	130.6 ± 11.5	128.7 ± 10.5	137.9 ± 12.7	**0.003**
Diastolic (mmHg)	76.6 ± 8.1	76.8 ± 8.1	75.8 ± 8.5	0.67
Asthma, n (%)	10 (8.1)	10 (9.6)	0 (0)	0.15
Migraine, n (%)	4 (3.2)	4 (3.8)	0 (0)	0.38

Bold values indicate that the p value is significant (less than 0.05).
[a]Information was considered missing if the parameter was not reported in the patient chart at first visit to the adolescent gynecologic clinic.
The data are expressed as number of patients (percentage) for categorical, median (range) for non-parametric, or mean ± SD for parametric variables.
BMI, body mass index; FtM, female-to-male; MtF, male-to-female; SD, standard deviation.

Table 2. Gynecological Background of 104 FtM Adolescents

Gynecologic parameters[a]	FtM ($n=104$)
Age at menarche (years)	
n (%)	103 (99.0)
Median (range)	12.0 (9.0–15.5)
Menstrual cycle (days)	
n (%)	86 (82.7)
Median (range)	30.0 (21.0–90.0)
Irregular menstruation, *n* (%)	12 (11.5)
Dysmenorrhea, *n* (%)	48 (46.2)
Clinical hyperandrogenism, *n* (%)	28 (26.9)
Acne	25 (24.0)
PCOS	2 (1.9)
Hirsutism	4 (3.8)
Clitoral hypertrophy	3 (2.9)
Ultrasound of ovaries at first visit, *n* (%)	77 (74.0)
Normal	66 (85.7)
Polycystic	8 (10.4)

[a]Information was considered missing if the parameter was not reported in the patient chart at first visit to the adolescent gynecologic clinic. The data are expressed as number of patients (percentage) for categorical or median (range) for non-parametric variables.

PCOS, polycystic ovary syndrome.

from the reference range were low density lipoprotein (LDL) cholesterol ($n=23$, 24.5%), prolactin ($n=17$, 22.7%), and high density lipoprotein (HDL) cholesterol ($n=17$, 18.1%). Blood samples were not taken during any specific phase of the menstrual cycle, and due to this, elevated luteinizing hormone (LH) values were not counted as aberrations. For MtF adolescents, a total of 92.7% of all baseline laboratory parameters were within the reference ranges (Table 3). The greatest aberrations were seen in prolactin ($n=9$, 50.0%), LDL cholesterol ($n=2$, 15.4%), and alanine aminotransferase (ALT) ($n=2$, 10.0%). Three of the high prolactin levels in MtF adolescents could be explained by use of under-the-counter hormonal treatment or an antipsychotic medication. No sex chromosomal anomalies were reported. Compared with their normal-weight peers in the cohort, FtM adolescents with overweight or obesity had higher median hemoglobin A1c (HbA1c) (32.0 [28.0–37.0] vs. 31.0 [27.0–34.0], $p=0.02$) and

Table 3. Baseline Laboratory Results for 124 Adolescents with Gender Dysphoria

Parameter	Unit	Group	*n*[a] (%)	Median (range)	Reference range[b]	Within reference range, *n* (%)
FSH	IU/L	FtM	95 (91.3)	4.7 (0.9–10)	0.2–8[c]	90 (94.7)
		MtF	19 (91.3)	3.6 (1–9.3)	0.2–8[c]	18 (94.7)
LH	IU/L	FtM	92 (88.5)	4.9 (0.1–26.2)	0.5–9[c]	72 (78.3)
		MtF	19 (88.5)	3.4 (0.1–9.5)	0.5–5.3[c]	16 (84.2)
Testosterone	nmol/L	FtM	94 (90.4)	1.1 (0.4–14.2)	0.4–2	85 (90.4)
		MtF	19 (90.4)	16.8 (0.4–26.4)	10–38	18 (94.7)
Estradiol	nmol/L	FtM	70 (67.3)	0.17 (0.05–9.11)	0.08–2.38	63 (90.0)
		MtF	19 (67.3)	0.1 (0.04–0.14)	<0.13	18 (94.7)
DHEAS	μmol/L	FtM	55 (52.9)	6.6 (0.2–21.1)	1–13[c]	48 (87.3)
		MtF	11 (52.9)	8.1 (1.8–19.6)	1–16[c]	10 (90.9)
ADION	nmol/L	FtM	52 (50.0)	5.3 (2.3–13)	0.3–10.3	48 (92.3)
		MtF	10 (50)	2.8 (1.6–5.1)	1–9.1	10 (100.0)
Hemoglobin	g/L	FtM	100 (96.2)	133 (83–157)	117–155	93 (93.0)
		MtF	19 (96.2)	150 (137–167)	134–167	19 (100.0)
Hematocrit	%	FtM	99 (95.2)	40 (30–45)	35–46	97 (98.0)
		MtF	19 (95.2)	45 (40–48)	39–50	19 (100.0)
Prolactin	mU/L	FtM	75 (72.1)	352 (129–1360)	102–496	58 (77.3)
		MtF	18 (72.1)	327.5 (132–780)	86–324	9 (50.0)
Fasting glucose	mmol/L	FtM	58 (55.8)	5.25 (4.5–6.1)	4–6	57 (98.3)
		MtF	12 (55.8)	5.25 (4.8–5.7)	4–6	12 (100.0)
HbA1c	mmol/mol	FtM	47 (45.2)	32 (27–37)	20–42	47 (100.0)
		MtF	6 (45.2)	33 (29–37)	20–42	6 (100.0)
ALT	U/L	FtM	99 (95.2)	14 (7–60)	<35	96 (96.0)
		MtF	20 (95.2)	15 (11–73)	<50	18 (90.0)
LDL	mmol/L	FtM	94 (90.4)	2.5 (0.58–4.6)	<3	71 (75.5)
		MtF	13 (90.4)	2.2 (1.7–3.2)	<3	11 (84.6)
HDL	mmol/L	FtM	94 (90.4)	1.45 (0.73–2.81)	>1.2	77 (81.9)
		MtF	13 (90.4)	1.43 (1.14–1.81)	>1	13 (100.0)
Total cholesterol	mmol/L	FtM	96 (92.3)	4.0 (2.8–6.3)	<5	83 (86.5)
		MtF	14 (92.3)	3.75 (3.3–4.7)	<5	14 (100.0)
TGL	mmol/L	FtM	93 (89.4)	0.79 (0.35–2.12)	<1.7	87 (93.5)
		MtF	13 (89.4)	0.82 (0.46–1.41)	<1.7	13 (100.0)

[a]Number of patients with particular test result available at baseline.

[b]Reference ranges for females (for FtM) and males (for MtF) obtained from HUSLAB laboratory at HUS Helsinki University Hospital were used. In LDL, HDL, TGL, and total cholesterol, Finnish National Dyslipidemia Guidelines for optimal lipid values were used.

[c]Reference range for adolescents was utilized.

ADION, androstenedione; ALT, alanine aminotransferase; DHEAS, dehydroepiandrosterone; FSH, follicle stimulating hormone; HbA1c, hemoglobin A1c; HDL cholesterol, high density lipoprotein cholesterol; LDL cholesterol, low density lipoprotein cholesterol; LH, luteinizing hormone; TGL, triglycerides.

ALT (17.0 [8.0–38.0] vs. 13.0 [7.0–39.0], $p < 0.01$), and lower HDL cholesterol levels (1.36 [0.73–1.79] vs. 1.47 [1.01–2.81], $p = 0.02$, Kruskal–Wallis test). Median total cholesterol, LDL cholesterol, and triglyceride levels did not differ between these groups (data not shown).

Psychiatric health

Thirty-six adolescents (29.0%) had a diagnosis for depression and 24 (19.4%) for anxiety at the time of referral to the gender identity research unit (Table 4). Thirty-one adolescents (25.6%) were using antidepressants. Autism, attention deficit hyperactivity disorder, psychotic disorders, and eating disorders were all scarce. The percentage of adolescents with depression or anxiety did not change with time. Timely trends within other psychiatric comorbidities could not be assessed due to their low prevalence.

Gender-affirming surgery, sexual orientation, and interest in fertility preservation

The MtF patients showed higher interest toward reconstructive genital surgery than FtM patients ($p < 0.001$, chi-square test) (Table 5). Interest toward gender-affirming surgery showed no timely trends (data not shown). The interest in preserving biological fertility was more common among MtF adolescents ($p = 0.007$, chi-square test). One adolescent had preserved oocytes and two had preserved sperm before initiating GAHT.

Family background

Information on parents was available for 119 (96.0%) adolescents. The parents of 70 adolescents (56.5%) had divorced, and 10 adolescents (8.4%) had experienced death or permanent hospitalization of a parent. A higher proportion of the adolescents with GD lived in a single-parent or stepfamily when compared with the general Finnish adolescent population (56.5% vs. 23.3%, $p < 0.001$, Pearson chi-square test). The mean number of children in the families was 2.13 (SD ±0.9). There were no reports of adolescents with family members having a history of GD.

All adolescents had attended or were currently attending compulsory education, and no reports of school dropouts were seen.

Table 4. Psychiatric Comorbidities and Antidepressant Use of 124 Adolescents at the Beginning of the Gender Identity Diagnostics Process

Psychiatric comorbidity	Total ($n = 124$)	FtM ($n = 104$)	MtF ($n = 20$)	p
Depression, *n* (%)	36 (29.0)	31 (29.8)	5 (25.0)	0.66
Anxiety, *n* (%)	24 (19.4)	20 (19.2)	4 (20.0)	0.94
ADHD, *n* (%)	5 (4.0)	3 (2.9)	2 (10.0)	0.14
Eating disorder, *n* (%)	2 (1.6)	2 (1.9)	0 (0)	0.53
Psychotic disorder, *n* (%)	2 (1.6)	2 (1.9)	0 (0)	0.53
Autism, *n* (%)	2 (1.6)	1 (1.0)	1 (5.0)	0.19
Medication				
Antidepressant use, *n* (%)	31 (25.6)	27 (26.2)	4 (22.2)	0.72

The data are expressed as number of patients (percentage).
ADHD, attention deficit hyperactivity disorder.

Table 5. Interest in Gender-Affirming Surgery and Fertility Preservation, and Self-Reported Sexual Orientation

Interest in gender-affirming surgery	FtM $n = 104$	MtF $n = 20$	p
Chest masculinization, *n* (%)	104 (100)		
Yes	100 (96.2)		
Not decided or interest not clearly stated	3 (3.0)		
No	1 (1.0)		
Hysterectomy and salpingo-oophorectomy, *n* (%)	104 (100)		
Yes	55 (48.3)		
Not decided or interest not clearly stated	29 (27.9)		
No	20 (19.2)		
Reconstructive genital surgery, *n* (%)	104 (100)	20 (100)	
Yes	23 (22.1)	16 (80.0)	**<0.001**
Not decided or interest not clearly stated	42 (40.4)	2 (10.0)	
No	39 (37.5)	2 (10.0)	
Fertility and reproduction			
Interested in preserving germ cells before GAHT, *n* (%)	61 (58.7)	12 (60.0)	
Yes	4 (6.6)	4 (33.3)	**0.007**
No	57 (93.4)	8 (66.7)	
Interested in adopting a child in the future, *n* (%)	60 (57.7)	11 (55.0)	
Yes	15 (25.0)	1 (9.1)	0.25
No	45 (75.0)	10 (90.9)	
Self-reported sexual orientation, *n* (%)	92 (88.5)	19 (95.0)	
Only women	45 (48.9)	0 (0.0)	
Only men	14 (15.2)	15 (78.9)	
Both women and men	28 (30.4)	3 (15.8)	
Pansexual	4 (4.3)	1 (5.3)	
Asexual	1 (1.1)	0 (0.0)	

Bold values indicate that the p value is significant (less than 0.05).
The data are expressed as number of patients (percentage). Information was obtained in an interview by the physician at the time of first visit to the adolescent gynecology clinic, before any gender-affirming hormonal or surgical treatment.
GAHT, gender-affirming hormonal treatment.

Discussion

This study shows that Finnish adolescents with GD and seeking hormonal interventions have been referred to the gender identity services at a relatively late, post-pubertal age of 16–17 years. Within the study period, there was a 5.2:1 overall ratio in FtM and MtF

adolescents at the adolescent gynecology clinic, and the ratio increased by time. Adolescents with GD were somatically healthy but had more overweight and obesity than the general adolescent population. Their laboratory test results were in most cases within reference ranges and did not show sex chromosome anomalies or overrepresentation of biochemical hyperandrogenism. Among FtM adolescents, acne and other expressions of clinical hyperandrogenism were reported in an age-typical pattern. Depression and anxiety were common, but other neuropsychiatric comorbidities and psychotic disorders were rare. Adolescents with GD had a higher parental divorce rate than the general Finnish adolescent population.

In Finland, an overall ratio of 7.1 between FtM and MtF patients has been previously reported in adolescents referred to gender identity services.[13] Our study shows a similar overall ratio of 5.2 in adolescents, who were further referred from the gender identity services to the adolescent gynecology clinic for GAHT. Finnish studies on the general adolescent population report a 1.6 ratio between self-reported FtM and MtF transgender identities.[18] This could imply that there are greater hindrances for MtF adolescents to seek GAHT when compared with FtM adolescents in Finland. In other Nordic countries, the ratios range from 1.7 in Norway to 4.1 in Denmark, with Finland having the greatest predominance of FtM patients.[13] The FtM predominance in adolescent patients has also been reported in other European countries and North America.[19]

The high prevalence of overweight and obesity in FtM adolescents is in line with studies from North America and Europe.[20–22] Probably due to the young age of the study subjects, high BMI did not reflect as major health or metabolic problems, but HbA1c and ALT levels were already higher than in their normal-weight peers. Although some studies have suggested that TG adolescents report more negative health behaviors (such as smoking, drug use, or unhealthy diet) than their cisgender peers,[20] our study found no such evidence in the Finnish cohort. Nevertheless, counseling on healthy lifestyle is important for all TG adolescents.

Vaginoplasty is associated with better functional results and less complications when compared with those of phalloplasty or metoidioplasty.[23] This could explain the higher interest toward reconstructive genital surgery among MtF patients. However, a significant proportion of the adolescents did not plan or were uncertain regarding genital surgery. When gonads are not removed, patients are likely to require higher doses of gender-affirming hormones to sustain the phenotype of the gender of identity.[1] Long-term and dose-dependent effects of GAHT on gonads, fertility, and the overall health of patients are not well known and should be evaluated in future prospective studies.

Our findings suggest a low interest in preserving germ cells before GAHT. Recent studies with similar results suggest that the low interest could result from dysphoria related to pregnancy and giving birth or fear of fertility preservation delaying the initiation of GAHT.[24] Further investigation is needed to better suit the family planning needs of TG youth. International guidelines suggest that adolescents should be consulted about their reproductive plans and interest in preserving biological fertility before GAHT.[1] Self-reported sexual orientation patterns in this study suggest that contraception must be actively offered to prevent not only sexually transmitted diseases but also unwanted pregnancies.

The depression diagnosis rates in this study were in line with previous studies on adolescents receiving GAHT.[25] On the other hand, studies concerning adolescents referred to gender identity services due to GD have reported depression rates of up to 60% in Finland and Great Britain.[3,26] Severe psychiatric comorbidities or poor social support may prevent or cause significant delays in the diagnostic process. Adolescents diagnosed with GD and receiving GAHT must, therefore, be considered a preselected group among all TG youth, especially in terms of psychiatric or neuropsychiatric comorbidities.

The high parental divorce rate noted in our study is in line with previous Finnish and British studies on adolescents with GD.[15,26] Further, there was a relatively high rate of childhood bereavement among our cohort. Both findings are alarming, as they may have a negative effect on the much-needed parental support during GAHT. In earlier studies, adequate parental support for adolescents with GD has been associated with higher life satisfaction, lower perceived burden of being transgender, and fewer depressive symptoms.[27]

This study has limitations due to its retrospective design. Adolescents receiving GAHT represent a selected population of all TG youth. This may emphasize the observed sex ratio and underestimate the rate of psychiatric comorbidities observed among the TG adolescents. The strengths of this study include its large sample size compared with other studies on adolescents with GD. In Finland, there are only two centers treating TG adolescents, both operating nationwide. Our study covers two thirds of all adolescents with

GD who sought GAHT during the study period, and it is likely a representative sample of this group of young patients in general. The health care services for adolescents in Finland are equal and strongly subsidized by the public sector, which allows people to seek treatment regardless of their socioeconomic background. Thus, our sample is less preselected than those in countries with insurance-based health care.

Conclusions

To our knowledge, this is one of the very few reports describing the somatic health and demographics among adolescents with GD-seeking GAHT and using a large and systematically gathered population of consecutive patients. As the number of TG youth seeking help from health care providers continues to grow, the authors believe that information gathered in this study is beneficial to other clinics treating young patients with GD. A well-timed and coordinated diagnostic and treatment process helps minimize the risks involved in providing GAHT. Future studies, including the prospective follow-up of this cohort, will focus on the safety of long-time hormonal treatment, and the structured measurement of quality of life during GAHT.

Implications and Contributions

Researchers and health care professionals need more information on the health of adolescents who are seeking gender-affirming hormonal treatment for gender dysphoria. Our study focuses on the physical health and psychosocial background of Finnish adolescents diagnosed with gender dysphoria seeking hormonal interventions at an adolescent gynecology clinic.

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Author Disclosure Statement

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Abbreviations Used

ADHD = attention deficit hyperactivity disorder
ADION = androstenedione
ALT = alanine aminotransferase
ANOVA = analysis of variance
BMI = body mass index
BP = blood pressure
DHEAS = dehydroepiandrosterone
FSH = follicle stimulating hormone
FtM = female-to-male
GAHT = gender-affirming hormonal treatment
GD = gender dysphoria
GnRH = gonadotropin-releasing hormone
HbA1c = hemoglobin A1c
HDL = high density lipoprotein
LDL = low density lipoprotein
LH = luteinizing hormone
MtF = male-to-female
PCOS = polycystic ovary syndrome
SD = standard deviation
SHP = Finnish School Health Promotion
TG = transgender
TGL = triglycerides